Abstract Submitted
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Comparison of numerical methods for 3D Fluid-Structure Interaction problems at low Reynolds numbers[1] CAYETANO MARTINEZ-MURIEL, RAUNO CAVALLARO, ROCCO BOMBARDIERI, OSCAR FLORES, MANUEL GARCIA-VILLALBA, Univ Carlos III De Madrid — The objective of this work is to compare two numerical methods to solve 3D FSI problems for flexible bodies. In both methods, the fluid phase is computed with the in-house code TUCAN, that solves the Navier-Stokes equations of the incompressible flow, where the presence of the body is modelled by using the Immersed Boundary Method proposed by Uhlmann (2005; J. Comp. Phys. 209). For the structural solver, the first method uses a multi-body algorithm (MB) based on the rigid-body dynamics algorithm proposed by Felis (2017; Auton. Robot. 41), modelling the flexibility of the body as a system of rigid bodies connected by flexible joints (i.e, springs). The second method employs an in-house, non-linear, finite-element structural solver (AUGUSTO) to model the flexibility of the body. Time-integration is performed using a β-Newmark method with numerical damping on high-order modal spurious artifacts. The coupling between the fluid solver (TUCAN) and the structural solver (MB or AUGUSTO) is weak in both cases. Results will be presented for a flexible plate ($\pi_0 = O(10^0 - 10^2), \pi_1 = O(10^{-4} - 10^{-2})$) immersed on a free stream ($Re = O(100)$), allowing a direct comparison between both structural solvers.

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